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In the Claims:

1. (Previously presented) An optoelectronic memory comprising:

an information-storage medium that can be locally and reversibly switched between at least two optical states by application of electrical fields to rotatable molecular components contained therein; and

an information-storage-layer-optical-state detection means that detects and reports the optical states of the rotatable molecular components in the information-storage medium.

2. (Original) The optoelectronic memory of claim 1 wherein the information-storage-layer-optical-state detection means further includes:

a detector layer within the information-storage medium that responds differently to an interrogating signal depending on the optical state of the information-storage medium; and

a read/write device that applies the interrogating signal to regions of the information-storage medium and generates a reporting signal based on a response of the detector layer.

- 3. (Previously presented) The optoelectronic memory of claim 2 wherein the detector layer responds to an electromagnetic-radiation-based interrogation signal that is transmitted through the information-storage medium when the information-storage medium is in a first optical state, and that is not transmitted through the information-storage medium when the information-storage medium is in a second optical state.
- 4. (Original) The optoelectronic memory of claim 2 wherein the detector layer responds to an electromagnetic-radiation-based interrogation signal that is transmitted through the information-storage medium by generating an electric current.

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- 5. (Original) The optoelectronic memory of claim 2 wherein the read/write device applies an electromagnetic-radiation-based interrogation signal to regions of the information-storage medium, detects whether or not the detector layer generates an electric current in response to the applied electromagnetic-radiation-based interrogation signal, and returns an electric-current or electric-voltage signal when the detector layer generates an electric current in response to the applied electromagnetic-radiation-based interrogation signal.
- 6. (Previously presented) An optoelectronic memory device comprising: an information-storage medium that includes an information-storage layer that can be locally and reversibly switched between at least two optical states by application of electrical fields to rotatable molecular components contained therein;

a detector layer within the information-storage medium that can detect whether or not an applied electromagnetic radiation beam is transmitted through the information-storage medium at different positions of the information-storage medium; and

a read/write device that applies electrical fields to write information into the information-storage layer and that applies electromagnetic-radiation beams in order to read information stored in the information-storage layer.

- 7. (Original) The optoelectronic memory device of claim 6 wherein the information-storage layer comprises a two-dimensional optical state-change organic polymer having a relatively rigid, fused-ring, organic-dye-based planar network and acetylene-linked rotatable molecular components.
- 8. (Previously presented) The optoelectronic memory device of claim 7 wherein the rotatable molecular components can be rotational oriented by application of an electrical field thereto.

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- 9. (Original) The optoelectronic memory device of claim 8 wherein the rotatable molecular components can be stably oriented in a rotational position coplanar with the relatively rigid, fused-ring, organic-dye-based planar network, leading to a fully conjugated organic-dye-based two-dimensional polymer that absorbs and/or reflects electromagnetic radiation of a particular frequency range, and wherein the rotatable molecular components can be stably oriented in a rotational position approximately orthogonal to the relatively rigid, fused-ring, organic-dye-based planar network, leading to a not-fully conjugated organic-dye-based two-dimensional polymer that is transparent to electromagnetic radiation of the particular frequency range.
- 10. (Previously presented) The optoelectronic memory device of claim 6 wherein the information-storage medium includes:

an information-storage layer comprising a two-dimensional optical state-change organic-polymer film that can be locally, stably, and reversibly switched between a first optical state that absorbs or reflects electromagnetic radiation of a particular frequency and a second optical state that is transparent to electromagnetic radiation of the particular frequency;

an electrode layer that is transparent to electromagnetic radiation of the particular frequency; and

a photodiode detector layer that, when illuminated by electromagnetic radiation of the particular frequency, generates a current.

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11. (Previously presented) The optoelectronic memory device of claim 10 wherein the read/write device applies an electrical field of a first polarity to a small region of the first, information-storage layer to induce the first optical state within that region to represent a first binary value, applies an electrical field of a second polarity to a small region of the first, information-storage layer to induce the second optical state within that region to represent a second binary value, and illuminates a small region of the first, information-storage layer in order to access information stored in the information-storage layer by detecting whether or not the photodiode detector layer generates an electrical current in response to the illumination.

12. (Previously presented) A method for storing a bit of information, the method comprising:

providing an optoelectronic memory device that includes an information-storage medium with an information-storage layer that can be locally and reversibly switched between at least two optical states by application of electrical fields to rotatable molecular components within the information-storage layer and that includes a detector layer within the information-storage medium that can detect whether or not an applied electromagnetic radiation beam is transmitted through the information-storage medium at different positions of the information-storage medium;

when the bit of information has a first binary value, applying an electrical field of a first polarity to a small region of the first, information-storage layer to induce the first optical state within that region; and

when the bit of information has a second binary value, an electrical field of a second polarity to the small region of the first, information-storage layer to induce the second optical state within that region.

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13. (Previously presented) The method of claim 12 further comprising: subsequently illuminating a small region of the information-storage layer in order to access information stored in the information-storage layer by detecting whether or not the detector layer generates an electrical current in response to the illumination.

- 14. (Original) The method of claim 12 wherein the information-storage layer comprises a two-dimensional optical state-change organic polymer having a relatively rigid, fused-ring, organic-dye-based planar network and acetylene-linked rotatable molecular components.
- 15. (Original) The method of claim 14 wherein the rotatable molecular components can be stably oriented in a rotational position coplanar with the relatively rigid, fused-ring, organic-dye-based planar network, leading to a fully conjugated organic-dye-based two-dimensional polymer that absorbs and or reflects electromagnetic radiation of a particular frequency range, and wherein the rotatable molecular components can be stably oriented in a rotational position approximately orthogonal to the relatively rigid, fused-ring, organic-dye-based planar network, leading to a not-fully conjugated organic-dye-based two-dimensional polymer that is transparent to electromagnetic radiation of the particular frequency range.
- 16. (Previously presented) A method for constructing an optoelectronic memory, the method comprising:

providing an information-storage medium that can be locally and reversibly switched between at least two optical states by application of electrical fields to rotatable molecular components contained therein; and

using an information-storage-layer-optical-state detection means to detect and report the optical states of regions of the information-storage medium.

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17. (Previously presented) The method of claim 16 wherein the information-storage-layer-optical-state detection means further includes:

a detector layer within the information-storage medium that responds differently to an interrogating signal depending on the optical state of the information-storage medium; and

a read/write device that applies the interrogating signal to regions of the information-storage medium and generates a reporting signal based on a response of the detector layer.

- 18. (Previously presented) The method of claim 17 wherein the detector layer responds to an electromagnetic-radiation-based interrogation signal that is transmitted through the information-storage medium, when the information-storage medium is in a first optical state, and that is not transmitted through the information-storage medium, when the information-storage medium is in a second optical state.
- 19. (Previously presented) The method of claim 17 wherein the detector layer responds to an electromagnetic-radiation-based interrogation signal that is transmitted through the information-storage medium by generating an electric current.
- 20. (Previously presented) The method of claim 17 further including: applying an electromagnetic-radiation-based interrogation signal to regions of the information-storage medium, using the read/write device, to detect whether or not the detector layer generates an electric current in response to the applied electromagnetic-radiation-based interrogation signal; and

returning an electric-current or electric-voltage signal when the detector layer generates an electric current in response to the applied electromagnetic-radiation-based interrogation signal.

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21. (Previously presented) An optoelectronic memory device, comprising: an information-storage medium having an information-storage layer therein that can be locally and reversibly switched between at least two optical states by application of an electric field thereto, said information-storage layer comprising a two-dimensional optical state-change organic polymer having relatively rigid, fused-ring, organic-dye-based planar network and acetylene-linked rotatable molecular components therein.

22. (Previously presented) The memory device of Claim 21, further comprising: a detector layer within said information-storage medium that can detect whether or not an applied electromagnetic radiation beam is transmitted through the information-storage medium; and

a read/write device configured to apply electrical fields while writing information into said information-storage layer and further configured to apply electromagnetic-radiation beams to said information-storage layer when reading information stored therein.

- 23. (Previously presented) The memory device of claim 22, wherein the rotatable molecular components can be rotationally oriented by application of an electrical field thereto.
- 24. (Previously presented) The memory device of claim 23, wherein the rotatable molecular components can be stably oriented in a rotational position coplanar with the relatively rigid, fused-ring, organic-dye-based planar network, leading to a fully conjugated organic-dye-based two-dimensional polymer that absorbs and/or reflects electromagnetic radiation of a particular frequency range, and wherein the rotatable molecular components can be stably oriented in a rotational position approximately orthogonal to the relatively rigid, fused-ring, organic-dye-based planar network, leading to a not-fully conjugated organic-dye-based two-dimensional polymer that is transparent to electromagnetic radiation of the particular frequency range.

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25. (Previously presented) A method of operating an optoelectronic memory device having an information-storage medium therein containing an information-storage layer that can be locally and reversibly switched between at least two optical states by application of electrical fields and that includes a detector layer within the information-storage medium that can detect whether or not an applied electromagnetic radiation beam is transmitted through the information-storage medium at different positions of the information-storage medium, said method comprising:

applying an electric field of a first polarity to a small region of the information-storage layer to induce the first optical state within that region that corresponds to a bit of information having a first binary value;

applying an electric field of a second polarity to the small region of the informationstorage layer to induce the second optical state within that region that corresponds to a bit of information having a second binary value; and

wherein the information-storage layer comprises a two-dimensional optical statechange organic polymer having a relatively rigid, fused-ring, organic-dye-based planar network and acetylene-linked rotatable molecular components therein.

26. (Previously presented) The method of claim 25,

wherein the rotatable molecular components can be stably oriented in a rotational position coplanar with the relatively rigid, fused-ring, organic-dye-based planar network, leading to a fully conjugated organic-dye-based two-dimensional polymer that absorbs and or reflects electromagnetic radiation of a particular frequency range; and

wherein the rotatable molecular components can be stably oriented in a rotational position approximately orthogonal to the relatively rigid, fused-ring, organic-dye-based planar network, leading to a not-fully conjugated organic-dye-based two-dimensional polymer that is transparent to electromagnetic radiation of the particular frequency range.

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